SEQUENCE LISTING

(1) GENERAL INFORMATION:

    (i) APPLICANT: Kaufman, Randal J.
               Wasley, Louise

   (ii) TITLE OF INVENTION: Method of Increasing Yield of Mature
        Proteins

  (iii) NUMBER OF SEQUENCES: 2

   (iv) CORRESPONDENCE ADDRESS:
        (A) ADDRESSEE: Genetics Institute, Inc.
        (B) STREET: 87 CambridgePark Drive
        (C) CITY: Cambridge
        (D) STATE: Massachusetts
        (E) COUNTRY: U.S.A.
        (F) ZIP: 02140

    (v) COMPUTER READABLE FORM:
        (A) MEDIUM TYPE: Floppy disk
        (B) COMPUTER: IBM PC compatible
        (C) OPERATING SYSTEM: PC-DOS/MS-DOS
        (D) SOFTWARE: PatentIn Release #1.0, Version #1.25

   (vi) CURRENT APPLICATION DATA:
        (A) APPLICATION NUMBER: US 07/621,092
        (B) FILING DATE: 26-NOV-1990
        (C) CLASSIFICATION: 424

 (viii) ATTORNEY/AGENT INFORMATION:
        (A) NAME: Kapinos, Ellen J.
        (B) REGISTRATION NUMBER: 32,245

   (ix) TELECOMMUNICATION INFORMATION:
        (A) TELEPHONE: (617)876-1170
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(2) INFORMATION FOR SEQ ID NO:1:

    (i) SEQUENCE CHARACTERISTICS:
        (A) LENGTH: 2385 base pairs
        (B) TYPE: nucleic acid
        (C) STRANDEDNESS: double
        (D) TOPOLOGY: unknown

   (ii) MOLECULE TYPE: DNA (genomic)

(ix) FEATURE:
    (A) NAME/KEY: CDS
    (B) LOCATION: 1..2382

 (x) PUBLICATION INFORMATION:
    (A) AUTHORS: van den Ouweland, A.M.W.
    (C) JOURNAL: Nucleic Acids Res.
    (D) VOLUME: 18
    (F) PAGES: 664-
    (G) DATE: 1990

 (xi) SEQUENCE DESCRIPTION: SEQ ID NO:1:

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ATG GAG CTC AGG CCC TGG TTC CTA TGG GTC GTA CCA CCA ACA GGA ACC        48
Met Glu Leu Arg Pro Trp Phe Leu Trp Val Val Pro Pro Thr Gly Thr
1               5                   10                  15

TTG GTC CTG CTA GCA GCT GAT GCT CAG GGC CAG AAG GTC TTC ACC AAC        96
Leu Val Leu Leu Ala Ala Asp Ala Gln Gly Gln Lys Val Phe Thr Asn
            20                  25                  30

ACG TGG GCT GTG CGC ATC CCT GGA GGC CCA GCG GTG GCC AAC AGT GTG       144
Thr Trp Ala Val Arg Ile Pro Gly Gly Pro Ala Val Ala Asn Ser Val
        35                  40                  45

GCA CGG AAG CAT GGG TTC CTC AAC CTG GGC CAG ATC TTC GGG GAC TAT       192
Ala Arg Lys His Gly Phe Leu Asn Leu Gly Gln Ile Phe Gly Asp Tyr
    50                  55                  60

TAC CAC TTC TGG CAT CGA GGA GTG ACG AAG CGG TCC CTG TCG CCT CAC       240
Tyr His Phe Trp His Arg Gly Val Thr Lys Arg Ser Leu Ser Pro His
65                  70                  75                  80

CGC CCG CGG CAC AGC CGG CTG CAG AGG GAG CCT CAA GTA CAG TGG CTG       288
Arg Pro Arg His Ser Arg Leu Gln Arg Glu Pro Gln Val Gln Trp Leu
                85                  90                  95

GAA CAG CAG GTG GCA AAG CGA CGG ACT AAA CGG GAC GTG TAC CAG GAG       336
Glu Gln Gln Val Ala Lys Arg Arg Thr Lys Arg Asp Val Tyr Gln Glu
                100                 105                 110

CCC ACA GAC CCC AAG TTT CCT CAG CAG TGG TAC CTG TCT GGT GTC ACT       384
Pro Thr Asp Pro Lys Phe Pro Gln Gln Trp Tyr Leu Ser Gly Val Thr
            115                 120                 125

CAG CGG GAC CTG AAT GTG AAG GCG GCC TGG GCG CAG GGC TAC ACA GGG       432
Gln Arg Asp Leu Asn Val Lys Ala Ala Trp Ala Gln Gly Tyr Thr Gly
    130                 135                 140

CAC GGC ATT CTG GTC TCC ATT CTG GAC GAT GGC ATC GAG AAG AAC CAC       480
His Gly Ile Leu Val Ser Ile Leu Asp Asp Gly Ile Glu Lys Asn His
145                 150                 155                 160
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CCC GAC TTG GCA GGC AAT TAT GAT CCT GGG GCC AGT TTT CAT GTC AAT          528
Pro Asp Leu Ala Gly Asn Tyr Asp Pro Gly Ala Ser Phe His Val Asn
            165             170             175

GAC CAG GAC CCT GAC CCC CAG CCT CGG TAC ACA CAG ATG AAT GAC AAC          576
Asp Gln Asp Pro Asp Pro Gln Pro Arg Tyr Thr Gln Met Asn Asp Asn
            180             185             190

AGG CAC GGC ACA CGG TGT GCG GGG GAA GTG GCT GCC GTG GCC AAC AAC          624
Arg His Gly Thr Arg Cys Ala Gly Glu Val Ala Ala Val Ala Asn Asn
            195             200             205

CGT GTC TGT GGT GTA GGT GTG GCC TAC AAC GCC CGC ATT GGA GGG GTC          672
Arg Val Cys Gly Val Gly Val Ala Tyr Asn Ala Arg Ile Gly Gly Val
            210             215             220

CGC ATG CTG GAT GGC GAG GTG ACA GAT GCA GTG GAG GCA CGC TCG CTG          720
Arg Met Leu Asp Gly Glu Val Thr Asp Ala Val Glu Ala Arg Ser Leu
225             230             235             240

GGC CTG AAC CCC AAC CAC ATC CAC ATC TAC AGT GCC AGC TGG GGC CCC          768
Gly Leu Asn Pro Asn His Ile His Ile Tyr Ser Ala Ser Trp Gly Pro
            245             250             255

GAG GAT GAC GGC AAG ACA GTG GAT GGG CCA GCC CGG CTC GCC GAG GAG          816
Glu Asp Asp Gly Lys Thr Val Asp Gly Pro Ala Arg Leu Ala Glu Glu
            260             265             270

GCC TTC TTC CGT GGG CTT AGC CAG GGC CGA GGG GGG CTG GGC TCC ATC          864
Ala Phe Phe Arg Gly Leu Ser Gln Gly Arg Gly Gly Leu Gly Ser Ile
            275             280             285

TTT GTC TGG GCC TCG GGG AAC GGG GGG CGG GAA CAT GAC AGC TGC AAC          912
Phe Val Trp Ala Ser Gly Asn Gly Gly Arg Glu His Asp Ser Cys Asn
            290             295             300

TGC GAC GGC TAC ACC AAC AGT ATC TAC ACG CTG TCC ATC AGC AGC GCC          960
Cys Asp Gly Tyr Thr Asn Ser Ile Tyr Thr Leu Ser Ile Ser Ser Ala
305             310             315             320

ACG CAG TTT GGC AAC GTG CCG TGG TAC AGC GAG GCC TGC TCG TCC ACA         1008
Thr Gln Phe Gly Asn Val Pro Trp Tyr Ser Glu Ala Cys Ser Ser Thr
            325             330             335

CTG GCC ACG ACC TAC AGC AGT GGC AAC CAG AAT GAG AAG CAG ATC GTG         1056
Leu Ala Thr Thr Tyr Ser Ser Gly Asn Gln Asn Glu Lys Gln Ile Val
            340             345             350

ACG ACT GAC TTG CGG CAG AAG TGC ACG GAG TCT CAC ACG GGC ACC TCA         1104
Thr Thr Asp Leu Arg Gln Lys Cys Thr Glu Ser His Thr Gly Thr Ser
            355             360             365
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GCC TCT GCC CCC TTA GCA GCC GGC ATC ATT GCT CTC ACC CTG GAG GCC        1152
Ala Ser Ala Pro Leu Ala Ala Gly Ile Ile Ala Leu Thr Leu Glu Ala
370                 375                 380

AAT AAG AAC CTC ACA TGG CGG GAC ATG CAA CAC CTG GTG GTA CAG ACC        1200
Asn Lys Asn Leu Thr Trp Arg Asp Met Gln His Leu Val Val Gln Thr
385                 390                 395                 400

TCG AAG CCA GCC CAC CTC AAT GCC AAC GAC TGG GCC ACC AAT GGT GTG        1248
Ser Lys Pro Ala His Leu Asn Ala Asn Asp Trp Ala Thr Asn Gly Val
                405                 410                 415

GGG CGG AAA GTG AGC CAC TCA TAT GGC TAC GGG CTT TTC GAC GCA GGC        1296
Gly Arg Lys Val Ser His Ser Tyr Gly Tyr Gly Leu Phe Asp Ala Gly
                420                 425                 430

GCC ATG GTG GCC CTG GCC CAG AAT TGG ACC ACA GTC GCC CCC CAG CGG        1344
Ala Met Val Ala Leu Ala Gln Asn Trp Thr Thr Val Ala Pro Gln Arg
                435                 440                 445

AAG TGC ATC ATC GAC ATC CTC ACC GAG CCC AAA GAC ATC GGG AAA CGG        1392
Lys Cys Ile Ile Asp Ile Leu Thr Glu Pro Lys Asp Ile Gly Lys Arg
450                 455                 460

CTC GAC CTC CGG AAC ACC GTG ACC GCG TCC CTG GGC GAG CCC AAC CAC        1440
Leu Asp Leu Arg Asn Thr Val Thr Ala Ser Leu Gly Glu Pro Asn His
465                 470                 475                 480

ATC ACT CGG CTG GAG CAC GCT CAG GCG CGG CTC ACC CTG TCC TAT AAT        1488
Ile Thr Arg Leu Glu His Ala Gln Ala Arg Leu Thr Leu Ser Tyr Asn
                485                 490                 495

CGC CGT GGC GAC CTG GCC ATC CAC CTG GTC AGC CCC ATG GGC ACC CGC        1536
Arg Arg Gly Asp Leu Ala Ile His Leu Val Ser Pro Met Gly Thr Arg
                500                 505                 510

TCC ACC CTG CTG GCA GCC AGG CCA CAT GAC TAC TCC GCA GAT GGG TTT        1584
Ser Thr Leu Leu Ala Ala Arg Pro His Asp Tyr Ser Ala Asp Gly Phe
                515                 520                 525

AAT GAC TGG GCC TTC ATG ACA ACT CAT TCC TGG GAT GAC GAT CCC TCT        1632
Asn Asp Trp Ala Phe Met Thr Thr His Ser Trp Asp Asp Asp Pro Ser
                530                 535                 540

GGG GAG TGG GTC CTA GAG ATT GAA AAC ACC AGC GAA GCC AAC AAC TAT        1680
Gly Glu Trp Val Leu Glu Ile Glu Asn Thr Ser Glu Ala Asn Asn Tyr
545                 550                 555                 560

GGG ACG CTG ACC AAC TCC ACC CTC GTA CTC TAT GGC ACC GCC CCT GAC        1728
Gly Thr Leu Thr Asn Ser Thr Leu Val Leu Tyr Gly Thr Ala Pro Asp
                565                 570                 575
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GGG CTC CCC GTA CCT CCA GAA AGC AGT GGC TGC AAG ACC CTC ACG TCC          1776
Gly Leu Pro Val Pro Pro Glu Ser Ser Gly Cys Lys Thr Leu Thr Ser
            580             585             590

AGT CAG GCC TGT GTG GTG TGC GAG GAA GGC TTC TCC CTC CAC CAG AAG          1824
Ser Gln Ala Cys Val Val Cys Glu Glu Gly Phe Ser Leu His Gln Lys
            595             600             605

AGC TGT GTC CAG CAC TGC CCT CCA GGC TTC GCC CCC CAA GTC CTC GAT          1872
Ser Cys Val Gln His Cys Pro Pro Gly Phe Ala Pro Gln Val Leu Asp
    610             615             620

ACG CAC TAT AGC ACC GAG AAT GAC GTG GAG ACC ATC CGG GCC AGC GTC          1920
Thr His Tyr Ser Thr Glu Asn Asp Val Glu Thr Ile Arg Ala Ser Val
625             630             635             640

TGC GCC CCC TGC CAC GCC TCA TGT GCC ACA TGC CAG GGG CCG GCC CTG          1968
Cys Ala Pro Cys His Ala Ser Cys Ala Thr Cys Gln Gly Pro Ala Leu
                645             650             655

ACA GAC TGC CTC AGC TGC CCC AGC CAC GCC TCC TTG GAC CCT GTG GAG          2016
Thr Asp Cys Leu Ser Cys Pro Ser His Ala Ser Leu Asp Pro Val Glu
            660             665             670

CAG ACT TGC TCC CGG CAA AGC CAG AGC AGC CGA GAG TCC CCG CCA CAG          2064
Gln Thr Cys Ser Arg Gln Ser Gln Ser Ser Arg Glu Ser Pro Pro Gln
            675             680             685

CAG CAG CCA CCT CGG CTG CCC CCG GAG GTG GAG GCG GGG CAA CGG CTG          2112
Gln Gln Pro Pro Arg Leu Pro Pro Glu Val Glu Ala Gly Gln Arg Leu
    690             695             700

CGG GCA GGG CTG CTG CCC TCA CAC CTG CCT GAG GTG GTG GCC GGC CTC          2160
Arg Ala Gly Leu Leu Pro Ser His Leu Pro Glu Val Val Ala Gly Leu
705             710             715             720

AGC TGC GCC TTC ATC GTG CTG GTC TTC GTC ACT GTC TTC CTG CTC CTG          2208
Ser Cys Ala Phe Ile Val Leu Val Phe Val Thr Val Phe Leu Leu Leu
                725             730             735

CAG CTG CGC TCT GGC TTT AGT TTT CGG GGG GTG AAG GTG TAC ACC ATG          2256
Gln Leu Arg Ser Gly Phe Ser Phe Arg Gly Val Lys Val Tyr Thr Met
            740             745             750

GAC CGT GGC CTC ATC TCC TAC AAG GGG CTG CCC CCT GAA GCC TGG CAG          2304
Asp Arg Gly Leu Ile Ser Tyr Lys Gly Leu Pro Pro Glu Ala Trp Gln
            755             760             765

GAG GAG TGC CCG TCT GAC TCA GAA GAG GAC GAG GGC CGG GGC GAG AGG          2352
Glu Glu Cys Pro Ser Asp Ser Glu Glu Asp Glu Gly Arg Gly Glu Arg
            770             775             780
```

```
ACC GCC TTT ATC AAA GAC CAG AGC GCC CTC TGA                    2385
Thr Ala Phe Ile Lys Asp Gln Ser Ala Leu
785                 790
```

(2) INFORMATION FOR SEQ ID NO:2:

    (i) SEQUENCE CHARACTERISTICS:
        (A) LENGTH: 794 amino acids
        (B) TYPE: amino acid
        (D) TOPOLOGY: linear

    (ii) MOLECULE TYPE: protein

    (xi) SEQUENCE DESCRIPTION: SEQ ID NO:2:

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Met Glu Leu Arg Pro Trp Phe Leu Trp Val Val Pro Pro Thr Gly Thr
1               5               10              15

Leu Val Leu Leu Ala Ala Asp Ala Gln Gly Gln Lys Val Phe Thr Asn
            20              25              30

Thr Trp Ala Val Arg Ile Pro Gly Gly Pro Ala Val Ala Asn Ser Val
            35              40              45

Ala Arg Lys His Gly Phe Leu Asn Leu Gly Gln Ile Phe Gly Asp Tyr
    50              55              60

Tyr His Phe Trp His Arg Gly Val Thr Lys Arg Ser Leu Ser Pro His
65              70              75              80

Arg Pro Arg His Ser Arg Leu Gln Arg Glu Pro Gln Val Gln Trp Leu
            85              90              95

Glu Gln Gln Val Ala Lys Arg Arg Thr Lys Arg Asp Val Tyr Gln Glu
            100             105             110

Pro Thr Asp Pro Lys Phe Pro Gln Gln Trp Tyr Leu Ser Gly Val Thr
    115             120             125

Gln Arg Asp Leu Asn Val Lys Ala Ala Trp Ala Gln Gly Tyr Thr Gly
    130             135             140

His Gly Ile Leu Val Ser Ile Leu Asp Asp Gly Ile Glu Lys Asn His
145             150             155             160

Pro Asp Leu Ala Gly Asn Tyr Asp Pro Gly Ala Ser Phe His Val Asn
                165             170             175

Asp Gln Asp Pro Asp Pro Gln Pro Arg Tyr Thr Gln Met Asn Asp Asn
            180             185             190
```

```
Arg His Gly Thr Arg Cys Ala Gly Glu Val Ala Ala Val Ala Asn Asn
        195             200             205

Arg Val Cys Gly Val Gly Val Ala Tyr Asn Ala Arg Ile Gly Gly Val
    210         215             220

Arg Met Leu Asp Gly Glu Val Thr Asp Ala Val Glu Ala Arg Ser Leu
225         230             235                 240

Gly Leu Asn Pro Asn His Ile His Ile Tyr Ser Ala Ser Trp Gly Pro
            245             250                 255

Glu Asp Asp Gly Lys Thr Val Asp Gly Pro Ala Arg Leu Ala Glu Glu
            260             265             270

Ala Phe Phe Arg Gly Leu Ser Gln Gly Arg Gly Gly Leu Gly Ser Ile
    275             280             285

Phe Val Trp Ala Ser Gly Asn Gly Gly Arg Glu His Asp Ser Cys Asn
    290             295             300

Cys Asp Gly Tyr Thr Asn Ser Ile Tyr Thr Leu Ser Ile Ser Ser Ala
305         310             315                 320

Thr Gln Phe Gly Asn Val Pro Trp Tyr Ser Glu Ala Cys Ser Ser Thr
            325             330             335

Leu Ala Thr Thr Tyr Ser Ser Gly Asn Gln Asn Glu Lys Gln Ile Val
            340             345             350

Thr Thr Asp Leu Arg Gln Lys Cys Thr Glu Ser His Thr Gly Thr Ser
        355             360             365

Ala Ser Ala Pro Leu Ala Ala Gly Ile Ile Ala Leu Thr Leu Glu Ala
    370             375             380

Asn Lys Asn Leu Thr Trp Arg Asp Met Gln His Leu Val Val Gln Thr
385             390             395                 400

Ser Lys Pro Ala His Leu Asn Ala Asn Asp Trp Ala Thr Asn Gly Val
            405             410                 415

Gly Arg Lys Val Ser His Ser Tyr Gly Tyr Gly Leu Phe Asp Ala Gly
            420             425             430

Ala Met Val Ala Leu Ala Gln Asn Trp Thr Thr Val Ala Pro Gln Arg
        435             440             445

Lys Cys Ile Ile Asp Ile Leu Thr Glu Pro Lys Asp Ile Gly Lys Arg
    450             455             460

Leu Asp Leu Arg Asn Thr Val Thr Ala Ser Leu Gly Glu Pro Asn His
465             470             475                 480
```

Ile Thr Arg Leu Glu His Ala Gln Ala Arg Leu Thr Leu Ser Tyr Asn
            485   490   495

Arg Arg Gly Asp Leu Ala Ile His Leu Val Ser Pro Met Gly Thr Arg
            500   505   510

Ser Thr Leu Leu Ala Ala Arg Pro His Asp Tyr Ser Ala Asp Gly Phe
            515   520   525

Asn Asp Trp Ala Phe Met Thr Thr His Ser Trp Asp Asp Asp Pro Ser
    530   535   540

Gly Glu Trp Val Leu Glu Ile Glu Asn Thr Ser Glu Ala Asn Asn Tyr
545   550   555   560

Gly Thr Leu Thr Asn Ser Thr Leu Val Leu Tyr Gly Thr Ala Pro Asp
            565   570   575

Gly Leu Pro Val Pro Pro Glu Ser Ser Gly Cys Lys Thr Leu Thr Ser
            580   585   590

Ser Gln Ala Cys Val Val Cys Glu Glu Gly Phe Ser Leu His Gln Lys
    595   600   605

Ser Cys Val Gln His Cys Pro Pro Gly Phe Ala Pro Gln Val Leu Asp
    610   615   620

Thr His Tyr Ser Thr Glu Asn Asp Val Glu Thr Ile Arg Ala Ser Val
625   630   635   640

Cys Ala Pro Cys His Ala Ser Cys Ala Thr Cys Gln Gly Pro Ala Leu
            645   650   655

Thr Asp Cys Leu Ser Cys Pro Ser His Ala Ser Leu Asp Pro Val Glu
            660   665   670

Gln Thr Cys Ser Arg Gln Ser Gln Ser Ser Arg Glu Ser Pro Pro Gln
            675   680   685

Gln Gln Pro Pro Arg Leu Pro Pro Glu Val Glu Ala Gly Gln Arg Leu
    690   695   700

Arg Ala Gly Leu Leu Pro Ser His Leu Pro Glu Val Val Ala Gly Leu
705   710   715   720

Ser Cys Ala Phe Ile Val Leu Val Phe Val Thr Val Phe Leu Leu Leu
            725   730   735

Gln Leu Arg Ser Gly Phe Ser Phe Arg Gly Val Lys Val Tyr Thr Met
            740   745   750

Asp Arg Gly Leu Ile Ser Tyr Lys Gly Leu Pro Pro Glu Ala Trp Gln
        755   760   765

Glu Glu Cys Pro Ser Asp Ser Glu Glu Asp Glu Gly Arg Gly Glu Arg
    770   775   780

Thr Ala Phe Ile Lys Asp Gln Ser Ala Leu
785   790